WHAT IS CLAIMED IS:

1. A resource allocation method for providing load balancing and fairness for a dual ring, the dual ring being shared by a plurality of nodes connected to local networks, comprising the steps of:

determining whether a bandwidth allocation request message is received from one of other nodes;

determining whether one or more of two rings of the dual ring fulfill a request of the bandwidth allocation request message on the basis of available bandwidths of the two rings and calculating weighted costs, if the bandwidth allocation request message is received;

allocating a path to one of the two rings having a lower weighted cost, if one or more of two rings fulfill the request of the bandwidth allocation request message;

providing a resource allocation information notification message to other nodes; and

ending a process without allocation of a path, if one or more of two rings cannot fulfill the request of the bandwidth allocation request message.

2. The resource allocation method as set forth in claim 1, wherein the bandwidth allocation request message includes information on a transmitting node, a receiving node, a

bandwidth, a priority and a lifetime.

3. The resource allocation method as set forth in claim 1, wherein the resource allocation information notification message carries information on a transmitting node, a receiving node, a sequence number, and bandwidths reserved from the transmitting node to other nodes.

4. The resource allocation method as set forth in any of claims 1 to 3, wherein at the step of calculating weighted costs, the weighted costs are calculated using the following equation

$$WC_{i,j} = Cost_{i,j}(\alpha\, priority + \beta C / ABW + \gamma\, life\_time)$$

where $WC_{i,j}$ is a weighted cost required to reach a receiving node Nj from a transmitting node Ni, $Cost_{i,j}$ is a cost required to reach a receiving node Nj from a transmitting node Ni, priority is the right to take precedence, life_time is lasting time, and α, β and γ are constants, and parameters that are used to adjust weighted values for a priority, an available bandwidth and a lifetime, respectively.

5. The resource allocation method as set forth in any of claims 1 to 3, wherein the step of calculating weighted costs is performed in such a way that if the two rings cannot

fulfill the request of the bandwidth allocation request message, the weighted costs are set to an infinite value, or values excessively larger than weighted costs for the case where the request of the bandwidth allocation request message can be fulfilled.

6. The resource allocation method as set forth in any of claims 1 to 3, wherein the step of providing the resource allocation information notification message comprises the steps of:

determining whether a bandwidth renewal message transmission period elapses or a request data is received;

increasing a sequence number if the bandwidth renewal message transmission period elapses or the request data is received; and

broadcasting a bandwidth renewal message carrying an increased sequence number, reserved bandwidth information and a priority.

7. The resource allocation method as set forth in any of claims 1 to 3, further comprising the steps of determining whether a sequence number of a currently received bandwidth renewal message equals a sequence number of a previously received bandwidth renewal message at the time of receiving the bandwidth renewal message, and renewing bandwidth

reservation information only when the sequence number of the currently received bandwidth renewal message equals the sequence number of the previously received bandwidth renewal message.

8. A resource allocation method for providing load balancing and fairness for a dual ring, the dual ring being shared by a plurality of nodes connected to local networks, comprising the steps of:

setting a current state to a previous state;

determining whether a downstream node is congested;

setting an allowed rate using equation $allow\_rate = my\_rate + (C - rev\_rate - my\_rate)/N$ (where allow_rate is an allowed rate of a base node, C is a rate of a link, rev_rate is a reserved rate, my_rate is an own rate of the base node, and N is a number of nodes) and setting the current state to a null state, if the downstream node is not congested;

determining whether an own rate of the base node is greater than an advertised rate of the downstream node, if the downstream node is congested;

setting the allowed rate using equation $allow\_rate = \min[my\_rate + (C - rev\_rate - my\_rate)/N, advertised\_rate]$ (where advertised_rate is an advertised rate) and setting the current state to a congested state, if the own rate of the base node

is not greater than the advertised rate of the downstream node;

determining whether the previous state is a congested state and whether a previous round trip time is not zero, if the own rate of the base node is greater than the advertised rate of the downstream node;

setting the previous round trip time to the previous round trip time minus one, if the previous state is the congested state and the previous round trip time is not zero, and setting a current round trip time to the previous round trip time, if the previous state is not the congested state and the previous round trip time is zero; and

setting the allowed rate using equation $allow\_rate = \max[my\_rate - \{RTT(c - rev\_rate)\}/2N, my\_rate/2, advertised\_rate]$ and setting the current state to a congested state.

9. The resource allocation method as set forth in claim 8, further comprising the steps of:

initializing parameters of a round trip time counter, an upstream round trip time timestamp and a downstream round trip time timestamp;

measuring a round trip time counting period, and increasing a round trip time counter by "1" when the round trip time counting period elapses;

setting the downstream round trip time timestamp to "0"

if a node is congested;

determining whether the increased round trip time counter has a maximum value; and

setting the upstream round trip time counter to the maximum value and resetting the round trip time counter to "0" if the round trip time counter has the maximum value, and setting the upstream round trip time timestamp to "0" if the round trip time counter does not have the maximum value.

10. The resource allocation method as set forth in claim 8 or 9, further comprising the steps of:

determining whether the downstream node is congested when the fair packet is received;

increasing the downstream round trip time timestamp by a round trip time of a base node if the downstream node is congested;

determining whether the downstream round trip time timestamp has a maximum value if the downstream node is not congested, ending a process if the downstream node is not congested and the downstream round trip time timestamp does not have the maximum value, and setting the round trip time to a value of the current round trip time counter if the downstream node is not congested and the downstream round trip time timestamp has the maximum value.

11. A resource allocation method for providing load balancing and fairness for a dual ring, the dual ring being shared by a plurality of nodes connected to local networks, each of the nodes being provided with a Primary Transit Queue (PTQ) and a Secondary Transit Queue (STQ), comprising the steps of:

reading a packet size of the STQ at regular intervals, and updating a local fair rate so that the local fair rate is reduced if a size of backlogged packets increases and the local fair rate approaches an initial rate if the size of backlogged packets decreases;

comparing the set local fair rate with a received rate of a packet, and setting an advertised rate; and

determining whether congestion has occurred, setting an allowed rate to the local fair rate if the congestion has occurred, and increasing the allowed rate by {(a non-reserved rate - a previous allowed rate)/a certain coefficient};

wherein the steps are performed at each of the nodes to control traffic of the node.

12. The resource allocation method as set forth in claim 11, wherein the step of updating the local fair rate comprises the steps of:

reading the packet size of the STQ at regular intervals, changing a value of a current packet size to a value of a

previous packet size, and setting the current packet size to the read packet size of the STQ;

comparing the read packet size of the STQ with a critical value;

if, as a result of the comparison, the read packet size of the STQ is equal to or smaller than the critical value, setting the local fair rate to the non-reserved rate;

if, as a result of the comparison, the read packet size of the STQ is larger than the critical value, setting an excessive rate of output link capacity to (a difference between the current packet size and the previous packet size/an interval at which the packet size is measured), and setting a current state to a congestion state;

comparing the current packet size with the previous packet size;

if, as a result of the comparison, the current packet size is larger than the previous packet size, setting the local fair rate to (the non-reserved rate/a number of nodes - the excessive rate); and

if, as a result of the comparison, the current packet size is equal to or small than the previous packet size, setting the local fair rate to {a current local fair rate - (the excessive rate/a number of active nodes × the critical value/the current packet size)}.

13. The resource allocation method as set forth in claim 11, wherein the step of setting the advertised rate comprises the steps of:

comparing the received rate of the packet with a set local fair rate;

if, as a result of the comparison, the received rate is higher than the set local fair rate, setting the advertised rate to the received rate; and

if, as a result of the comparison, the received rate is equal to or lower than the set local fair rate, setting the advertised rate to the set node fair rate;

wherein the advertised rate is transferred to an upstream node at regular intervals and becomes a received rate at the upstream node.

14. The resource allocation method as set forth in claim 11, wherein, at the step of setting the allowed rate according to the congestion, the coefficient is set to prevent a rapid change of the allowed rate.

15. The resource allocation method as set forth in claim 11, further comprising the step of updating the allowed rate so as to transfer traffic equal to or lower than the allowed rate at an a corresponding node, the step of updating the allowed rate comprising the steps of:

initializing the allowed rate to a small value;

setting an add rate to a value obtained by dividing a difference between the non-reserved rate and the allowed rate by a number of active nodes;

comparing the local fair rate with the received rate of the packet;

if, as a result of the comparison, the local fair rate is higher than the received rate, setting the allowed rate to a lower one of the received rate and a value obtained by adding the added rate to the allowed rate; and

if, as a result of the comparison, the local fair rate is equal to or lower than the received rate, setting the allowed rate to a lower one of a value obtained by adding an added allowed rate to a self-rate and the local fair rate.

16. A computer-readable storage medium, comprising:

a medium body; and

a program stored in the medium body, the program being designed to execute steps of a method described in any of claims 1 to 15.